DOCUMENT RESUME

ED 032 002 HE 001 072

By-Pinnell, Charles; And Others

Automated Registration System for Colleges and Universities.

Texas A and M Univ., College Station.
Spons Agency-Office of Education (DHEW), Washington, D.C. Div. of Coll. Facilities.; Texas Coll. and Univ. System, Austin. Coordinating Board.
Pub Date May 69
Note-57p.
EDRS Price MF-$0.25 HC-$2.95
Descriptors-*Automation, *Computers, Data Processing, *Educational Technology, Enrollment, *Higher Education, Recordkeeping, *School Registration, Student Records
Identifiers-*Texas A&M University

This study concentrated on the investigation and development of a computerized system of student registration, sectioning, and record handling. The report presents the results of the study and describes a pilot system that was developed at Texas A&M University. The basic system is discussed, along with the procedures involved in data collection, schedule construction, and fee assessment. Conclusions are made that: 1) the system was very effective in increasing the ability to provide students with desired courses; 2) much better student counselling system resulted from the study; 3) the overall student record and reporting system was improved greatly; 4) the manual effort and time required to complete the registration process was greatly reduced; and 5) the student acceptance of the system was generally good, although there was a lack of ability to select individual professors and specific course times. Recommendations are made for colleges and universities considering the implementation of such a system. (DS)

ED032002

AUTOMATED REGISTRATION SYSTEM FOR COLLEGES AND UNIVERSITIES

Report Developed For

THE COORDINATING BOARD-TEXAS COLLEGE AND UNIVERSITY SYSTEM

By

Dr. Charles Pinnell
Director, Planning and Analytical Studies

Dean H. L. Heaton
Dean of Admissions and Records

Mr. Elliott Bray
Systems Analyst,
Planning and Analytical Studies

Mr. Robert Lacey
Registrar

Mr. Lester Wood
Systems Analyst,
Planning and Analytical Studies

Texas A&M University

Mr. James Blakesley, Mr. Charles Sherwood,
and Associates-Purdue University
Project Consultants

May 1969

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

HE 001 072

ACKNOWLEDGEMENTS

Sincere appreciation is extended to the Coordinating Board-Texas College and University System for sponsoring this study. Mr. Kenneth H. Ashworth, Assistant Commissioner for Federal Programs and Facilities Planning and Mr. William J. Martin, Director of Facilities Planning, both of the Coordinating Board staff, provided support and guidance to this research effort.

Appreciation is also expressed to President Earl Rudder and the administrative staff of Texas A&M University for their support of this project. The registration system was developed and implemented at Texas A&M University and we are grateful for the support and cooperation obtained at all levels of the university.

This study was financed from funds provided by the Coordinating Board-Texas College and University System, the U. S. Office of Education, and Texas A&M University. Appreciation is expressed to these agencies for this support.

Finally, numerous members of the faculty and staff at Texas A&M University have provided valuable suggestions and assistance to this project and this contribution is gratefully acknowledged.

Dr. Charles Pinnell
Project Director

TABLE OF CONTENTS

I. INTRODUCTION
- A. Background 3
- B. Basic Considerations 4
- C. Project Scope 5
- D. Project Objectives 6
- E. Presentation 6

II. BASIC SYSTEM
- A. Pre-registration 8
- B. Fee Collection and Schedule Distribution 9
- C. Delayed Registration 9
- D. Schedule Revision 10
- E. Total System 10

III. DATA COLLECTION
- A. Master Schedule of Classes 15
- B. Student Record System 18
- C. Student I. D. Card 19
- D. Course Requests 22
- E. Fee Information 22
- F. Computer Input 26
- G. Special Schedule Requirements 26

IV. SCHEDULE CONSTRUCTION
- A. Computer System 30
- B. Input Preparation Phase 30
- C. Scheduling Phase 32
- D. Output Phase 35
- E. Utility Functions 37

V. FEE ASSESSMENT
- A. Fee Data Collections 41
- B. Initial Fee Assessment..... 46
- C. Fee Update Procedures 46
- D. Board Installment Payments 52

VI. ADDITIONAL PROCEDURES
- A. Schedule Distribution 54
- B. Delayed Registration 55
- C. Schedule Revisions 55

VII. SYSTEM EVALUATION
- A. Calendar of Events 63
- B. Registration Data 64
- C. Conclusions 65
- D. Recommendations 66

VIII. APPENDIX 67

INTRODUCTION

BACKGROUND

This report is the result of special studies conducted for the Coordinating Board - Texas College and University System by Texas A&M University. In February of 1966, two research projects were initiated which had the following titles:

(1) The Development of a Model System for Master Planning in Institutions of Higher Education in Texas

(2) The Development of Scientific Techniques for Space Management and Utilization in Colleges and Universities

These projects had the basic objective of examining modern scientific management techniques and determining specific applications that could be utilized in college and university administration. The results of a major portion of the research projects have been published in a five-volume series entitled "Guidelines for Planning in Colleges and Universities."

The studies of space management and the need for student information for administrative planning defined the need to focus attention on registration procedures and student record systems. Thus a separate and specific study was initiated to examine the application of computer technology and scientific management techniques to the area of student registration and student records. This report will present the results of this study and will describe a pilot system that was developed at Texas A&M University.

BASIC CONSIDERATIONS

The basic control over the utilization of teaching facilities (classrooms, laboratories) and faculty resides in the process of scheduling the use of these resources. Two separate steps are required in this process which are:

(1) Master Schedule Construction

(2) Student Sectioning

The master schedule construction consists of examining faculty resources, teaching facility resources, and curriculum requirements and assigning a room, time, and faculty member to each section of every course that is to be offered. It can be seen that an almost infinite number of choices are available in making this total assignment. The efficient and effective utilization of both faculty and facilities as well as the ability to furnish students with a workable schedule of desired courses is dependent upon this assignment.

Student sectioning is the process of utilizing a master schedule of courses and student requests for these courses to prepare a class schedule for each student. The basic concern here is to maximize the probability that each student can obtain the courses he has requested and to obtain effective utilization of faculty and facilities.

Master Schedule Construction

The basic data required to prepare a master schedule of classes are discussed as follows:

> Faculty Resources - Each course must be considered and the faculty members which are qualified and available to each course must be listed. Also teaching load, time restrictions, and preferred course assignments must be provided for each faculty member.

Teaching Facilities - Each room (classroom or lab) available for teaching must be listed along with its characteristics (number of student stations, special equipment, etc.).

Course Requests - An estimated student demand for each course must be established.

Curriculum Requirements - The relationship of each course to overall curriculum requirements must be considered. This will permit the establishment of special time configurations or other specific scheduling requirements.

The final master schedule should be responsive to constraints imposed by the above data and should attempt to achieve the following two basic goals:

(1) Develop a schedule of classes which will maximize the ability of the student body to obtain curricular requirements, and

(2) Provide for efficient utilization of faculty and facilities.

The total optimization of a master schedule is an extremely difficult task due to the dimensionality of the problem.

Student Sectioning

A student sectioning program utilizes the course request of the student body and master schedule of classes to produce an individual class schedule for each student. The master schedule provides the blueprint for maximizing the ability of individual students to obtain required courses and for obtaining good utilization of facilities and faculty. The student sectioning program is the means for implementing this blueprint and provides the overall control of the scheduling process that is required.

PROJECT SCOPE

After consideration of the two basic tasks (master schedule construction and student sectioning) and the application of computer technology, it was determined that the development of a computerized system of master schedule construction was beyond the scope of this project. It was determined, however, that the development of a computerized system of student registration and sectioning was a feasible objective and that such a

system would provide great benefits to those responsible for space utilization, administration, student information, and planning in colleges and universities. Therefore, the project concentrated on the investigation and development of a computerized system of student registration, student sectioning, and student record handling.

PROJECT OBJECTIVES

After examining the process of registration and sectioning, the following items were established as objectives of the system development:

(1) To provide a process which will assure good counseling of each student relative to the academic program which he is pursuing.

(2) To provide a system which will maximize the probability that a student can obtain the courses which he is requesting.

(3) To provide a system which will assure good utilization of teaching facilities and faculty.

(4) To provide a system which will promote good administration in terms of planning, record maintenance, and information reporting.

(5) To provide a system which will minimize the manual effort and time required of students and staff in completing the registration process.

(6) To provide a system which could handle large volumes of students within reasonable time limits.

The system which will be discussed in this report is a result of concerted efforts to achieve these objectives.

PRESENTATION

The remainder of this report will provide a discussion of an automated system of registration and student sectioning. This system was tested and implemented at Texas A&M University and conclusions and recommendations presented are based upon actual experience with the system.

BASIC SYSTEM

The basic system which was developed contains four major phases which are:

(1) Pre-registration

(2) Fee Collection and Schedule Distribution

(3) Delayed Registration

(4) Schedule Revisions

These four phases will be briefly discussed here to develop a concept of the total system and developed in detail in later sections of this report.

PRE-REGISTRATION

This phase of the system is basically one of data collection. The following information must be collected relative to each student that desires to register:

(1) List of courses for which he desires to register

(2) Fee information providing data from which to prepare a fee statement

This information must be obtained well in advance of the semester.

The development of course requests for each student introduces an opportunity and need for counseling. It was determined that each student should report to his major department and secure an approved course request from an advisor. Before approving a course request for a student, the advisor has the opportunity to review his academic progress and to advise him relative to his program of studies.

Once a student obtains an approved course request, he then reports to a central office where information that will be necessary to the fee assessment program is collected. This information includes the following:

(1) Housing Information - University housing or non-university housing

(2) Meal Plan if using university food service facilities

(3) Parking Requirements and other special requirements

After obtaining an approved course request and providing information relative to fee assessment, the student then turns all of these data in at a central registration headquarters. This step completes the pre-registration phase.

FEE COLLECTION AND SCHEDULE DISTRIBUTION

Once course request information is available for all students, this information is prepared for input to a computer sectioning program. This program compares the student requests to a master schedule of classes and assigns the student to a section for each course requested.

After a schedule of classes has been developed for a student, a fee statement is then prepared by the computer. The program for fee assessment considers the courses for which the student is scheduled, his housing and food arrangement, special fees, and any fee exemptions that may be applicable in the preparation of the fee statement.

When the fee statement is completed by the computer, it is printed and mailed to the student. As soon as payment for fees is received from a student, he is mailed his schedule of classes. This schedule of classes contains the time and location of each course for which he is scheduled and serves as his permit to enter class. If the schedule requires no changes, then the student has completed his registration.

DELAYED REGISTRATION

There will be some students who cannot be present for the pre-registration process and must be registered during a delayed registration period. This period will be scheduled one week prior to the beginning of the semester for which the student is registering. The registration process will be the same as for pre-registration with one exception. The exception is that the students will pick up their schedules at a central point instead of receiving them by mail.

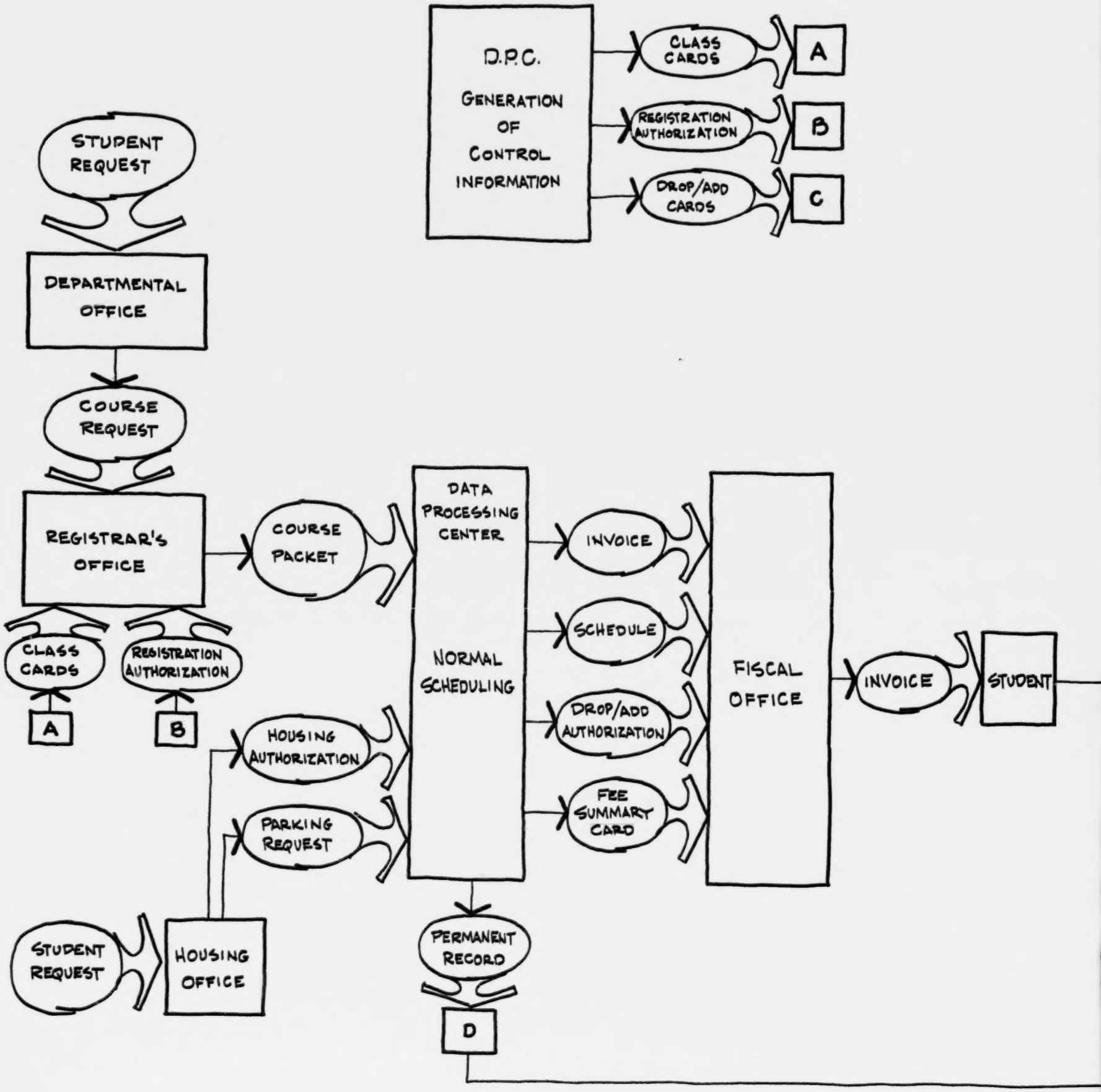
SCHEDULE REVISIONS

It will also be necessary for some students to change their schedules by adding and/or dropping courses from their initial schedules. The add and drop process is initiated with the approval of an advisor in the student's major department. If the request to add and/or drop a course is approved, information for accomplishing this change is input to the computer and a revised schedule of classes is prepared for the student.

TOTAL SYSTEM

The previous material has provided a brief description of each of the major phases of the registration operation. It should now be possible to visualize the total system. Figure I is provided to assist the understanding of the procedures and logical flow of the system by providing graphical presentation.

Following sections of this report will discuss each of the major elements of the system in detail. The final section will provide an evaluation of the system and summary conclusions.


D.P.C.
GENERATION OF CONTROL INFORMATION
CLASS CARDS
A
REGISTRATION AUTHORIZATION
B
DROP/ADD CARDS
C
STUDENT REQUEST
DEPARTMENTAL OFFICE
COURSE REQUEST
REGISTRAR'S OFFICE
CLASS CARDS
A
REGISTRATION AUTHORIZATION
B
COURSE PACKET
DATA PROCESSING CENTER
NORMAL SCHEDULING
HOUSING AUTHORIZATION
PARKING REQUEST
STUDENT REQUEST
HOUSING OFFICE
PERMANENT RECORD
D
INVOICE
SCHEDULE
DROP/ADD AUTHORIZATION
FEE SUMMARY CARD
FISCAL OFFICE
INVOICE
STUDENT

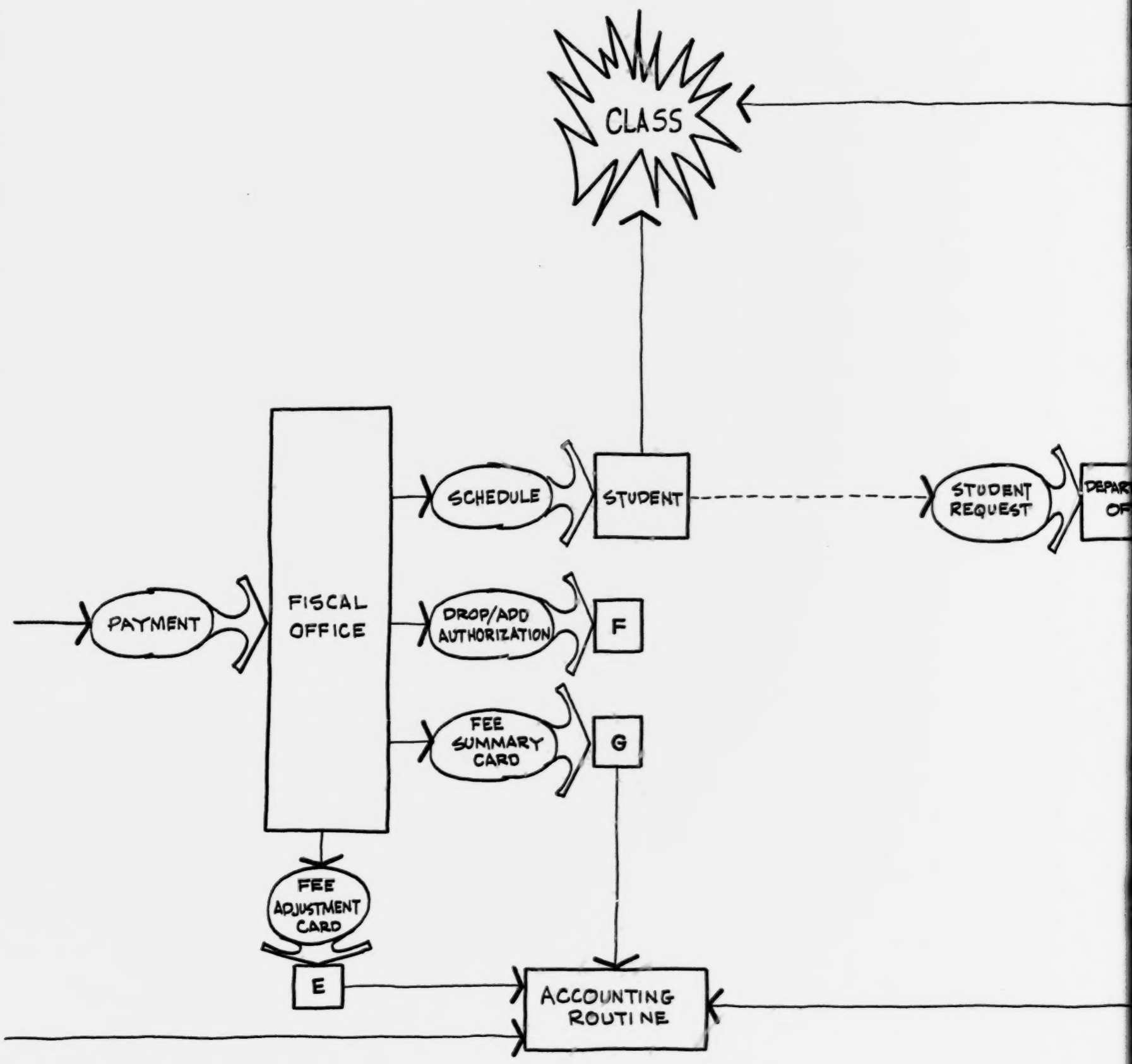
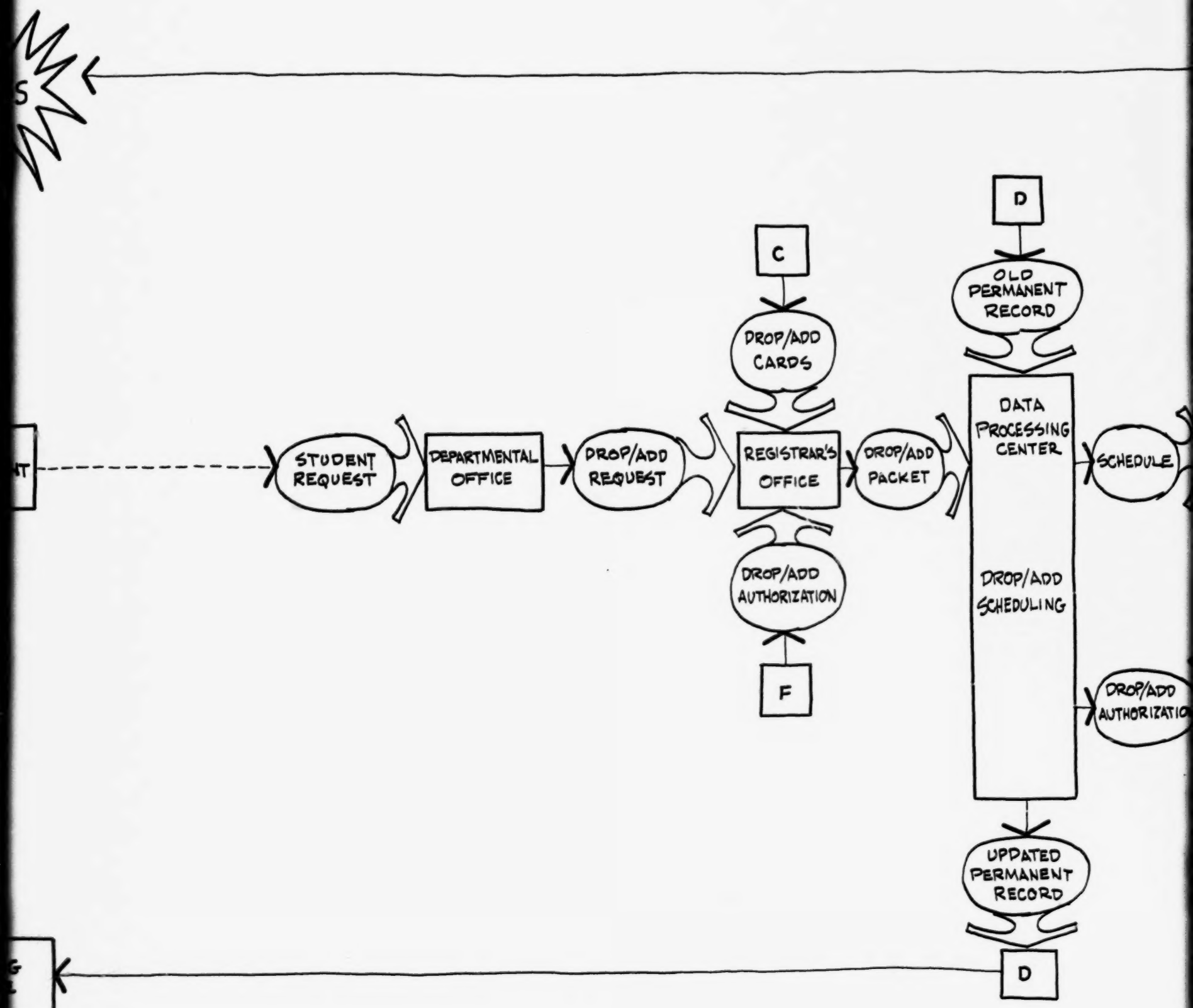
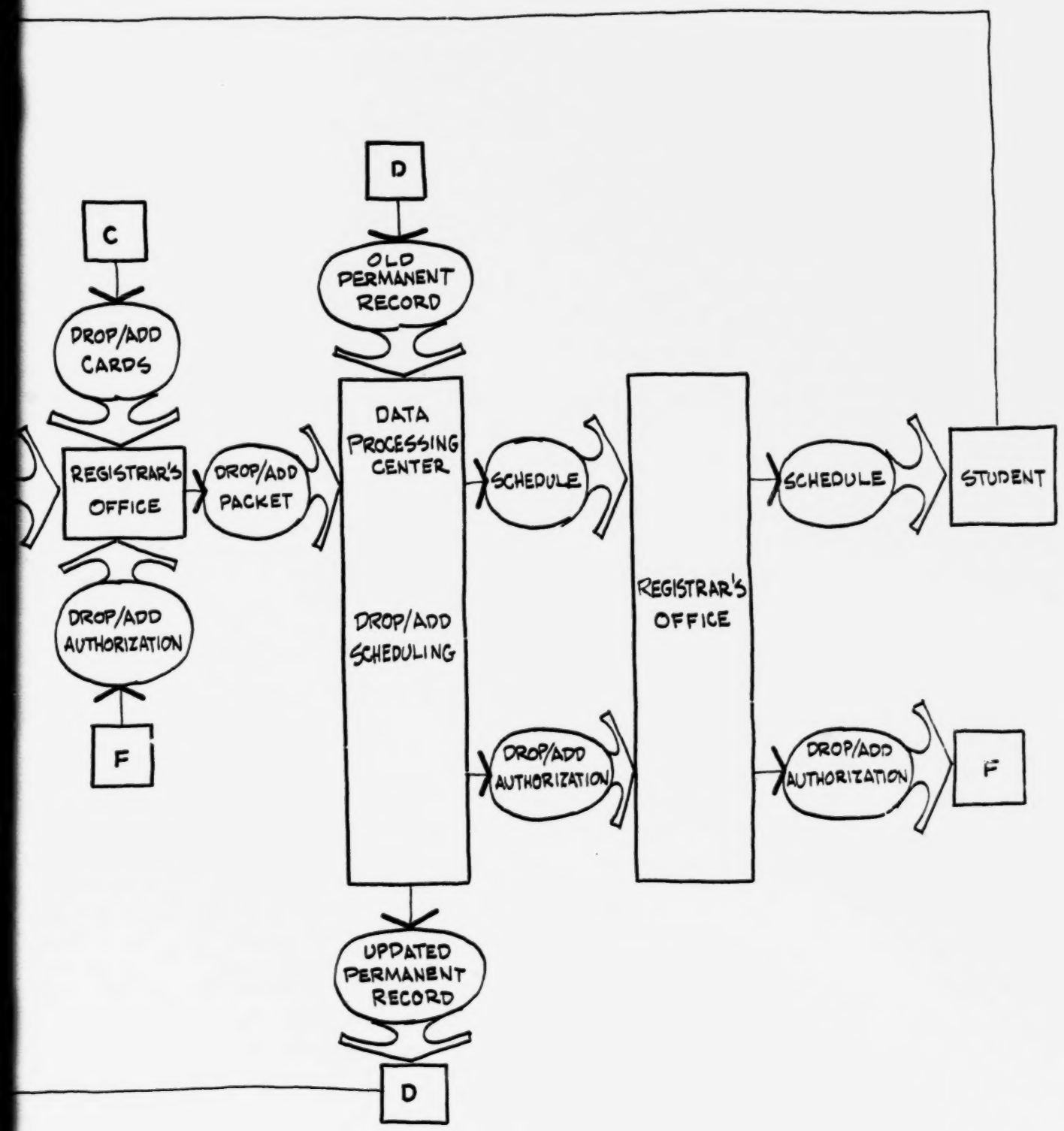


FIG 1

SYSTEM FLOW CHART


S
C
D
OLD PERMANENT RECORD
DROP/ADD CARDS
NT
STUDENT REQUEST
DEPARTMENTAL OFFICE
DROP/ADD REQUEST
REGISTRAR'S OFFICE
DROP/ADD PACKET
DATA PROCESSING CENTER
SCHEDULE
DROP/ADD AUTHORIZATION
DROP/ADD SCHEDULING
F
DROP/ADD AUTHORIZATIO
UPDATED PERMANENT RECORD
D


C
DROP/ADD CARDS
REGISTRAR'S OFFICE
DROP/ADD PACKET
DROP/ADD AUTHORIZATION
F
D
OLD PERMANENT RECORD
DATA PROCESSING CENTER
DROP/ADD SCHEDULING
UPDATED PERMANENT RECORD
D
SCHEDULE
DROP/ADD AUTHORIZATION
REGISTRAR'S OFFICE
SCHEDULE
DROP/ADD AUTHORIZATION
F
STUDENT

DATA COLLECTION

The process of student registration involves a rather massive data collection effort. This phase of the process is very vital to a successful operation, for complete and accurate student data must be imput to the computer if the proper output of fee statements and student schedules is to be obtained.

MASTER SCHEDULE OF CLASSES

One of the most significant elements of an automated registration system is a properly constructed master schedule of classes. The master schedule of classes for any given semester or term must be so constructed as to satisfy the course and credit requirements prescribed for all students in all curricula and at the same time programmed to attempt to optimize utilization of class room and laboratory facilities. In the construction of such a master schedule of classes, the effective and efficient use of staff time must also be considered.

In the construction of the master schedule of classes, the University Scheduling Officer must, of necessity, rely upon departmental scheduling officers to a large degree. In the final analysis, however, the University Scheduling Officer must make the final decision in those matters which might affect the students adversely or those situations which might result in poor utilization of staff and/or facilities. The University Scheduling Officer has as his responsibility the construction of the master schedule of classes from its beginning until its final distribution.

At the proper time, a communication is sent to the various academic departments in the nature of a request for offerings for the succeeding semester. Under this procedure the departmental scheduling officer is given an opportunity to indicate his own plans for a schedule of classes insofar as his department is concerned. His request includes: (1) course

and number; (2) name of instructor designated to teach the course; (3) the number of theory and practice sections desired per course; (4) the number of students to be admitted to each section of theory and practice in each course; (5) the building and rooms desired for meeting of the theory and practice of each course and section; and (6) the preferred hours for courses and sections to be offered. This complete report is then mailed to the appropriate dean for his approval or disapproval. The dean, in turn, forwards his recommendation to the University Scheduling Officer. The University Scheduling Officer prepares a major pattern schedule for each curricula for a given semester. These time patterns or trial schedules are compared with the request submitted by various departments and transferred to a summary sheet showing section by section the time patterns for each individual section. Variations in time patterns requested by departmental representatives to those established by the University Scheduling Officer are reconciled with final authority for deciding the time patterns resting with the University Scheduling Officer. Upon completion of the tentative master schedule of classes, it is mimeographed and submitted to all departments of the University for review. Minor modifications and adjustments may be made with the approval of the University Scheduling Officer.

At this time the departmental representatives may make classroom and laboratory assignments in those areas where they may have some priority. Their requests for these assignments are returned to the University Scheduling Officer who checks the assignments and makes additional ones which could not be made by the departmental representatives. Upon the completion of this scheduling, the schedule is then printed and distributed as needed. One copy is submitted to the Data Processing Center in order that the complete schedule may be key punched for computer input. The computer will

TEXAS A & M UNIVERSITY

STUDENT UNIFORM RECORD - REGISTRAR

OFFICE OF THE REGISTRAR

STUDENT NUMBER	ALPHA NUMBER	CLASS	COURSE OF STUDY	LAST NAME	FIRST NAME	MIDDLE NAME	SUFFIX	TITLE	DATE OF BIRTH	RES CODE	SOCIAL SECURITY NO	STAFF	DATE OF THIS FORM
65331877407		3	MGMT	REINHARDT	ROBERT	N			01/24/48	Y	377 48 1359		02/29/68

TITLE OF PARENT OR GUARDIAN	NAME OF PARENT OR GUARDIAN	STREET OR P. O. NUMBER	CITY	STATE	ZIP CODE	GR	DATE ENTERED A & M	
	K W REINHARDT	1535 CONTINENTAL	BEAUMONT	TEXAS	77706		965	

LOCAL MAILING ADDRESS	CITY	STATE	ZIP CODE	SEX	MARITAL STATUS	TEXAS COUNTY	
P O BOX 7097	COLLEGE STATION	TEXAS	77840	M	S	JEFFERSON	

LOCAL RESIDENCE ADDRESS	CITY	STATE	ZIP CODE	PHONE NUMBER	DORM	ROOM NUMBER	IN CORPS	CORPS UNIT	
				-	6	406	Y	SQDN 11	

SELECTIVE SERVICE NO.	SEL SER CLASS	LOCAL BOARD NO.	STREET OR P. O. BOX NUMBER	CITY	STATE	ZIP CODE	
41 7448 84	2S	74	P O BOX 907	BEAUMONT	TEXAS	77704	

COURSE OF STUDY CODE	REGISTERED IN SEMESTER							DROPPED	BLOCKED	PROBATION	REGISTERATION RESTRICTED	U S CITIZEN	CITIZEN OF FOREIGN COUNTRY	ENGLISH PROFICIENCY	GRE	SUMMER PRACTICE	GRADE REPORT WRITTEN							
	FALL	SPRING	1ST SS	2ND SS	FALL TRIMESTER	SPRING TRIMESTER	SUMMER TRIMESTER										FALL	SPRING	1ST SS	2ND SS	FALL TRIMESTER	SPR NO. TRIMESTER	SUMMER TRIMESTER	
1220	*	*	*	*								Y												

TOTAL WORK		TRANSFER WORK		A & M WORK				MAJOR WORK				TOTAL HOURS		REGULAR SEMESTER HOURS		TRIMESTER HOURS		REG IN ABSENTIA	DATE DROPPED OR RESIGNED A & M	
HOURS	GRADE POINTS	HOURS	GRADE POINTS	HOURS ATTEMPTED	HOURS PASSED	GRADE POINTS	GRADE POINT RATIO	HOURS ATTEMPTED	HOURS PASSED	GRADE POINTS	GRADE POINT RATIO	HOURS REG	AUDIT HOURS	HOURS REG	AUDIT HOURS	HOURS REG	AUDIT HOURS			
068	111	000	000	094	068	111	1.1809	006	006	015	2.5000	20	00	20	00	00	00		/ /	

DEPT.	SUBJECT	COURSE	SECTION	COURSE DESCRIPTION	TYPE SEM	SEM DATE	HOURS CREDIT	AUDIT	MID-SEM GRADE	FINAL GRADE	DATE COMPLETED	PROF NAME	
09	ACCT	228	234	PRIN. OF ACCOUNTING		268	04					JW COLEMAN	
18	BAVA	337	500	DATA PROCESSING		268	03					WC ATKINSON	
25	ECON	318	501	ECONOMICS OF LABOR		268	03					P MILLER	
33	FIN	341	330	CORPORATION FINANCE		268	03					LL PITCAITHLY	
60	MKTG	321	337	MARKETING		268	03					JM DEHAY	
55	MGMT	363	501	PRIN. OF MANAGEMENT		268	03					LR BURGESS	
75	P E	302	592	PHYSICAL EDUCATION		268	01					RB BARKER	

FIG 11

TEXAS A&M STUDENT RECORD

then be in position to prepare the Schedule of Classes for each individual student after he has selected his courses in consultation with his advisor.

STUDENT RECORD SYSTEM

A basic working tool which should be developed prior to entering into an automated registration system is a computerized student record system. Such a system develops and maintains a very complete record on each student. This record should be on magnetic tape or disc to facilitate computer utilization of all the information contained on the record. Figure II illustrates the basic data items that should be developed relative to each student at Texas A&M.

At Texas A&M, the student record is constructed as soon as a student is admitted to the university. This computer file on the student is then utilized to receive, maintain, and distribute information relative to the student throughout his stay at the university. When the student graduates, pertinent data from this file is transferred to a similar file maintained in the Former Students Office.

When a student is admitted to Texas A&M University, he is assigned a six-digit I. D. number for identification purposes. A social security number could be used for this purpose also. Basic information on the student is then prepared for input to the computer file. An error check system is utilized to assure that the student I. D. number is correctly recorded on the computer file since this will be the means of accessing any given student's file for information. This computerized record of the student body then becomes available for use in many aspects of the registration and student record system as will be illustrated in the following discussions.

STUDENT I.D. CARD

As the requirements for the data collection system were examined, it became apparent that some means of automating the data collection was highly desirable. The basic objectives of such a system were defined as follows:

(1) To eliminate manual collection and manipulation

(2) To provide a highly accurate method of data collection

The objectives previously stated defined the need for a special type of student I.D. card. Since the student I.D. number was the key element required to access the student record file and work with student data on the computer, an I.D. card which would contain this number in Hollireth form was deemed necessary. With such an I.D. card in the hands of each student, it then became possible to automate the data collection process in a very accurate and rapid manner.

I.D. CARD PREPARATION

The following steps describe the process that was used to prepare the I.D. card:

(1) The student record (see previous section) is utilized to generate a data card of the type illustrated in Figure III. This permits an accurate transmission of the student's I.D. number from the computer to a data card.

(2) The student comes to a central registration headquarters to obtain an I.D. card. The data card (prepared in Step 1) for the student is pulled and placed in a special camera which takes a picture of a portion of the data card and the student. This picture is developed in approximately one minute, laminated, and trimmed to form the I.D. card.

(3) The next step is to punch the student I.D. number into the I.D. card. This step is accomplished using the I.B.M. card prepared in step 1, the I.D. card prepared in step 2, and a special machine shown in Figure IV. This machine accepts the I.B.M. card in one slot and the I.D. card in a second slot. The operator can then punch a button causing the machine to read the student I.D. number from the data card and to automatically punch this number into the student I.D. card in Hollireth code. The finished I.D. card which is then furnished to the student is shown in Figure V.

665007 2 MART BLACKBURN THOMAS W III

TEXAS A&M UNIVERSITY
COLLEGE STATION, TEXAS
NON–TRANSFERABLE
(FOR UNIVERSITY USE ONLY)

1968-69

– INSTRUCTION –

THIS CARD TO BE PHOTOGRAPHED

1. USE BLACK INK
2. SIGN YOUR NAME

Sign Here →	
Student Name: BLACKBURN THOMAS W III	
Student Number: 665007	Birth Date: 04-30-48

DO NOT FOLD

THIS CARD TO BE PRESENTED TO PHOTOGRAPHER

FIG III
PICTURE CARD

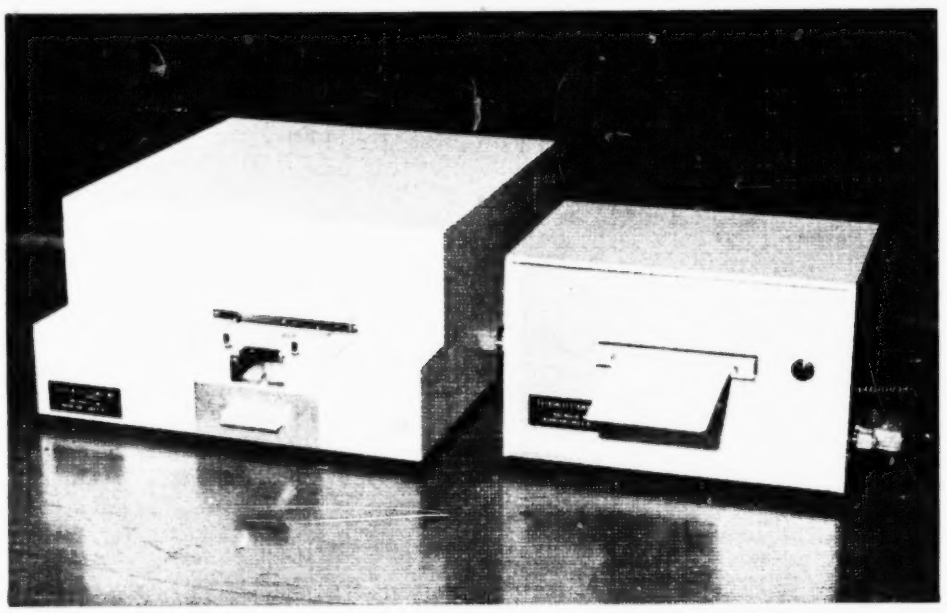


FIG IV
ID BADGE
PUNCH

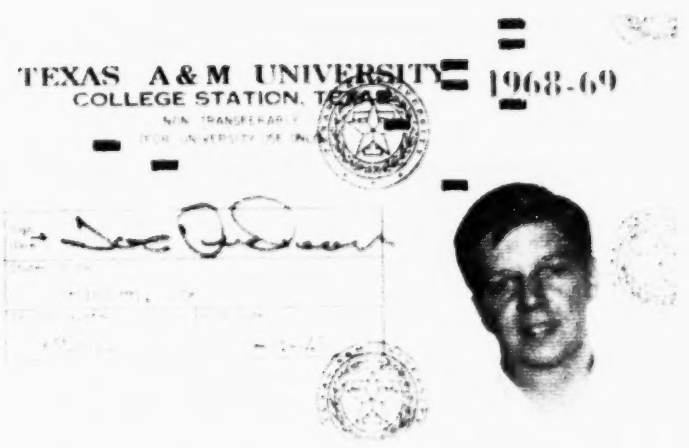
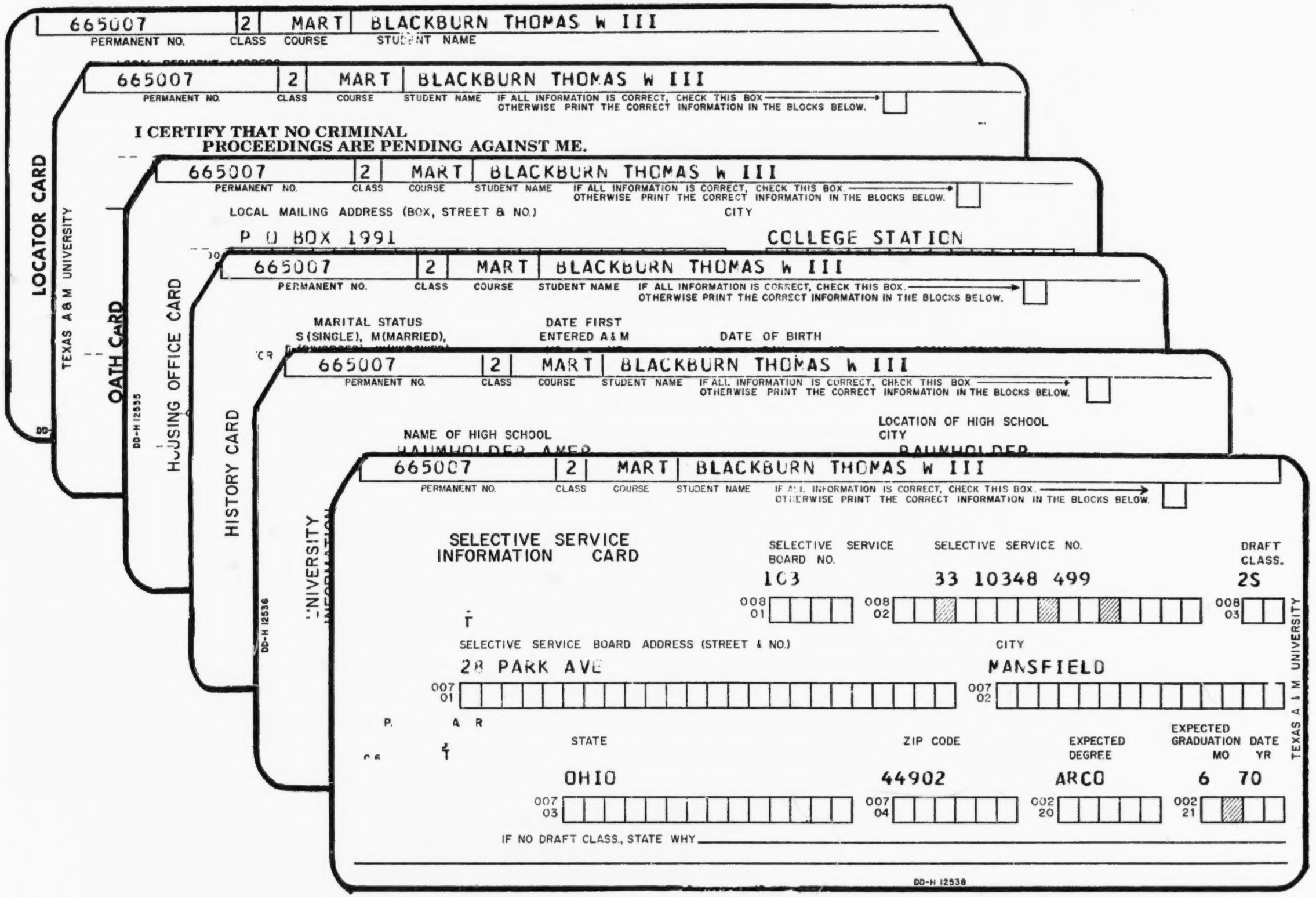


FIG V
FINISHED ID CARD



REGISTRATION PACKET

FIG VI

COURSE REQUESTS

Once a student has obtained an I.D. card, he can then proceed to request courses. The course request is completed at the student's major department. Each department is furnished a packet of cards for every student in that department. These cards are prepared by the computer from the student record file. Samples of these cards are illustrated in Figure VI.

The following steps are involved in completing the course request procedure:

(1) Each student reports to his major department and requests a card packet. If his records are in order, such a packet will be available. If he has changed majors and the paper work has not cleared through the proper channels, then he will have to clear up this record discrepancy before proceeding further.

(2) After obtaining a packet, the student then reports to an advisor in his department to obtain an approved course request card. At this time the advisor can review his academic program and progress and give him counseling assistance relative to the courses he will request.

(3) When a list of desired courses has been developed, a master schedule of classes is consulted to determine if at least one workable schedule of these classes can be obtained. The advisor then lists the courses requested on the course request card (see Figure VII) and signs to indicate his approval of the course request.

(4) The student is then given the entire packet of cards and is instructed to report to a central registration headquarters.

FEE INFORMATION

After the student completes the course request procedure at the department office, he then reports to a central registration headquarters to complete the pre-registration process. The procedure here has two basic objectives which are:

(1) To collect necessary information for assessing the student's fees.

(2) To check the students' card packets for any errors and to collect these packets for future input to the computer.

665007 2, MART — PERMANENT NUMBE: CL S & OURSE

BLACKBURN THOMAS W III — S L E ENT AME

06525

FALL SEMESTER 1968.

TEXAS A&M UNIVERSITY
OFFICE OF TI E RE ISTR .R

FAL' SEMESTER

ASSIGNMENT CARD

SEMESTER			A&M TOTALS			TOTAL	
R	P	G.PTS.	HRS.	G. PTS.	RATIO	HRS.	G. PTS
			79	38	C.481	79	38

DEPT.	COURSE NO	CREDIT	SECTION	SIGNED

TOTAL CREDIT HOURS

APPROVED BY DEAN

AMP.05 A

FIG VII

COURSE REQUEST CARD

HART A2
845-4306

1

FULL STU SERV YES--- NO---

PARKING NONE--- 1-SEM---

BOARD 5-DAY--- 7-DAY---

PAY PLAN FULL--- INSTL---

SIGNATURE----------

FIG VIII

HOUSING CARD

The steps the student follows in completing this process are as follows:

(1) The student first obtains a housing card (see Figure VIII). If the student lives in a university dorm, this card will contain the dorm name and room number. If the student does not live in university housing, he obtains a day student card which will indicate this status.

(2) After obtaining the proper housing card, the student then moves to a station which will summarize all required fee information into one card. This procedure requires the housing data card, student I.D. card, and a special machine which can read the student's I.D. number from the I.D. card and punch this number plus other fee information into the housing card.

This machine is shown in Figure IX. It accepts the I.D. card in one slot, the housing card in another slot, and a master information card in a third slot. In addition, it has a keyboard for entering special information which will vary for each student.

The student presents his I.D card and housing data card to a machine operator. These items plus a master information card are placed into the machine and the student is asked for additional fee information such as parking, yearbook, etc. and this information is entered into a keyboard. The operator then presses a button and all of the information (student I.D. number and fee data) is punched into blank fields on the housing card automatically. This assures a correct student I.D. number and all fee information has now been punched into one I.B.M. card.

(3) The student next reports to a check station. The checker at this location assures that all necessary information is available and in correct form. If everything is in order, the student packet is taken up and this step completes the pre-registration process for the student.

COMPUTER INPUT

When a student packet is obtained from a student at the end of the pre-registration process, it is then prepared for input to the computer. The steps involved here are as follows:

(1) A pre-punched course card is pulled for each course that is listed on the student's course request card. Tub files are used to contain the course cards and desired course cards are pulled from these files.

(2) The card packet next goes to a checking station to assure that the course cards match those listed on the course request card.

(3) The completed packet containing the course cards, the fee data card, and the student information cards is now sent to the data processing center. At the data processing center, the information will be loaded on to tape for future input to the scheduling and fee assessment programs.

SPECIAL SCHEDULE REQUIREMENTS

There will be some students who must have special consideration in the development of their schedules. Examples of groups of students who must participate in special activities during the normal class day are as follows:

(1) Band students

(2) Athletes

(3) Student leaders

(4) Students who work in the food service

(5) Students who must work at specific times

Provisions can be made to provide this special consideration by scheduling "free time". This free time blocks certain hours of the day and requires that the computer schedule the course requests at other hours.

Free time requests are limited to only those students which must have special considerations. Requests for this consideration must be justified before and approved by the dean's office of the college in which the student is majoring.

The "free time" scheduling can be attempted on a trial basis. That is, the "free time" requested will be scheduled if possible but if it cannot be scheduled, then it will be ignored. If certain "free time" hours must be obtained they may be "predetermined". This is done by submitting a special data card.

SCHEDULE CONSTRUCTION

As anyone who has taken a trip with a baby can readily verify, "packing" just the child isn't sufficient. The mount of auxiliary equipment taken as well is sometimes almost staggering. The unpleasant fact is also true of a computerized student sectioning system. The computer system can be described in terms of its design objectives and the programs necessary to meet these objectives and the programs necessary to feed and clothe it.

COMPUTER SYSTEM

While the form of the input data effects HOW the sectionizing algorithm must be constructed to meet its design objectives, the process of supplying the "scheduler" with its input is relatively independent of the design objectives. Thus we can logically separate the sectionizing computer system into at least four main areas or "phases":

(1) Input Preparation Phase

(2) Scheduling Phase

(3) Output Phase

(4) Utility Functions

INPUT PREPARATION PHASE

In this section of the report only two of the three main input streams will be considered, the master schedule and the student course requests. The third data stream, mailing addresses and certain fee information, will be discussed in the Fee Calculation Section.

MASTER SCHEDULE

Obviously, in order for it to assign students to sections, the computer must have an "inventory" of the sections, or the "master schedule". One sequence of programs accepts the master schedule as produced by the Registrar's Office and builds such an inventory, called the Course-Data-File or CDF.

All succeeding program sequences utilize parts or all of the CDF in meeting their objectives. Thus the scheduler will only use that part which contains information about the times and number of students in each section while the print routines are only concerned with where the classes are to meet. From the above statement it can correctly be deduced that an assumption made by the scheduling system is that all room conflicts have already been resolved.

STUDENT COURSE REQUEST

The student course request packet has already been described in Section III. This packet contains:

(1) An assignment (authorization to register) card.

(2) Course request cards.

(3) Student information cards.

(4) A housing card.

(5) Optional fee information cards.

The packets are first processed on a 1401 computer to find as many handling errors (misplaced cards, blank cards, cards turned upside down, etc.) as possible and to separate the student information cards from the rest of the packet.

The packets have now been reduced to just the information needed to sectionize the student and to assess fees. They are now input into the automated system itself.

The input preparation program now builds one "student schedule request" record for the packs which have survived a rigorous edit designed to validate the consistence and correctness of the request data itself. The locations of packets in error are flagged for future recovery and correction and the correct student schedule requests are passed to the scheduling phase.

SCHEDULING PHASE

DESIGN OBJECTIVES

As previously mentioned, the objective of the sectionizing algorithm is to maximize the probability that a student can obtain the courses which he requires. This objective reduces to the strategy that as many sections as possible are to remain open as long as possible. Thus the balancing of section loads is the prime constraint. There is a further constraint, however, on the undergraduate student. Since single male undergraduates live in university dormitories and pay board, the program is designed to reserve a lunch hour each day. As will be seen later, these restrictions can be relaxed if necessary.

Sectionizing Algorithm - The actual process of assigning the students is perhaps best explained by the use of an example. Assume a student has requested the following courses:

CHEM 303

E.E. 312

MATH 204

PHYS 217

During the process of building the Course Data File, each course is assigned a priority based on the number of sections and the number of contact hours that the course required during the week. Because of this priority assignment, the courses will be assigned in the order shown in Figure X. It can also be seen that the sections within each course are in descending order by the number of seats remaining in the course.

The assignment process proceeds by tentatively assigning E.E. 312 section 500. Section 132 of PHYS 217 is attempted next, but due to the lunch hour restriction cannot be assigned. There is no conflict with the assignment of section 134, however, so it is tentatively assigned and an

COURSE	SECTION	SEATS LEFT	MEETING TIME
E E 312	500	10	MWF 11
PHYS 217	132	20	MWF 12
	134	20	MWF 10
	133	19	MWF 1
MATH 204	131	60	MWF 8
	147	40	MWF 9
	149	40	MWF 8 F3
	132	39	TTH 9 F4
CHEM 303	500	25	MW 8 F2-5
	237	25	MW 8 T2-5
	501	24	MW 8 TH2-5
	502	23	TTH 2 M8-10

COURSE DATA BLOCKS

FIG X

assignment of MATH 204 is tried.

Since there is no conflict with the courses already assigned, section 131 of MATH 204 is tentatively assigned and the process proceeds to CHEM 303. There is no section of CHEM 303 which does not conflict with the prior assignments, however. The process backs up to the last course assigned and "erases" the tentative assignment and makes a new one. Thus MATH 204 section 131 is taken out and section 147 is attempted. Again there is no conflict, so CHEM 303 is again attempted. Now, an assignment to section 500 can be made and since this is the last course, all tentative assignments are made permanent.

There are two important features of the process which should be noted. First, unless otherwise directed, the algorithm will always attempt an assignment into sections with the greatest number of seats left. Second, if necessary, the process will attempt all possible combinations of section assignments before "giving up".

SPECIAL REQUESTS

Circumstances do arise when it is necessary to override the section balancing aspects of the sectionizing system and specify particular sections for one or more courses. In these instances the process assigns those sections without checking for conflicts with the rest of the schedule. In this way sections of courses, which in fact are in conflict, but in practice will either be shifted later or for a particular student the conflict will be overlooked, can be "predetermined" and therefore be forced to meet at the same time.

REJECTS

Unfortunately, there will be schedule requests which cannot be met.

These will be one of four types:

(1) Hour Conflicts - All times for two or more courses overlap.

(2) Lunch Hour Conflict - A schedule does not exist which would honor the lunch hour constraint.

(3) Closed Division Reject - A schedule is only possible if the student could be scheduled into a closed section.

(4) Processing Errors - Usually due to predetermining a closed or nonexistent section.

The rejected requests are passed to a program which analyzes the cause of the reject. This program will be discussed later in the next section.

OUTPUT PHASE

The separation of the output phase from the scheduling phase is due as much to design considerations as to strictly programming considerations. The prime advantage is that the printing of student class schedules and the assessment of fees (also performed in this phase and discussed later) can be deferred as long as necessary. This allows changes to be made to classroom locations up until a fairly late date without affecting the student's printed schedule. In this way the system can also be used as a "simulator" to determine the best allocation of sections without having to print schedules.

REJECTS

These schedules which failed to schedule must be located and some corrective action must be taken. One part of the scheduling system attempts to analyze the cause of the rejection and to indicate the action to be taken. Figures XIa and XIb are two examples of rejected requests and the results of the analysis. As it can be seen, all the reject causes are listed, the type of conflict is described, and if possible, the particular courses which caused the reject are listed. These reports are returned to the student's advisor for the corrective action.

SCHEDULE REVISION RUN OF 31/JAN/69 FOR SPRNG 69 D/A 5

STU NR	NAME	CLASS,CURRICULUM	SEQ	ERROR	CONDITION
686985	FANNIN STEPHEN G	1,L A	01490	REQUESTED CLOSED COURSE	

COURSES REQUESTED-

SUBJECT	COURSE	DIVISION
ENGL	104	
MGMT	105	
P E	202	
HIST	102	
MATH	102	

THE ERROR OCCURED IN THIS REQUEST-

INDEX	SUBJECT	COURSE	DIVISION
0664	HIST	102	

FIG XIA

SCHEDULE REVISION RUN OF 31/JAN/69 FOR SPRNG 69 D/A 5

STU NR	NAME	CLASS,CURRICULUM	SEQ	ERROR	CONDITION
670622	GENSLER PHILIP J	8,I EN	01701	HOUR CONFLICT	

COURSES REQUESTED-

SUBJECT	COURSE	DIVISION
I EN	647	
I EN	681C	
I EN	646	
I EN	685G	

THIS IS THE CONFLICT SET-

SUBJ	CRS	DIV	MEETING TIME	
I EN	685G	01	TTH11	
I EN	646	01	T10-1	TH10-1

FIG XIB

SCHEDULE REJECTS

UTILITY FUNCTIONS

The great advantage of any pre-registration system is that advance information about course loads and requirements can be obtained. This implies, however, some means of both obtaining the course loadings and modifying the master schedule.

An enrollment can be produced at any time which presents the current status of the course enrollments. Figure XII is a sample of this report and also is an example of section balancing obtainable with the scheduling system.

Provisions are made to modify the master schedule in almost any way. Sections and/or complete courses may be added; sections may be opened, closed, or cancelled; meeting places and times may be changed; etc. These changes may be carried out at any time, however, they must be made with the understanding that existing schedules might be affected.

SUBJ	NR	CRS	SECT	DIV	MEETING TIME		LIMIT	ENROLLED	LEFT	NOTES	PCT FILL
CHEM	20	101	104	01	MWTH1	T2-5	25	24	1		
			106	02	TTH9F3	M8-11	25	22	3		91.3
			108	03	MWTH1	T2-5	25	25			
			114	04	TTH9F3	M8-11	25	22	3		
			156	05	MWTH1	T8-11	25	23	2		
			181	06	MWTH1	T2-5	25	25			
			193	07	TTH9F3	M2-5	25	21	4		
			500	08	MWTH1	T8-11	25	24	1		
			501	09	TTH9F3	M2-5	25	21	4		
			502	10	MWTH1	T8-11	25	23	2		
			503	11	TTH9F3	M8-11	25	22	3		
			504	12	MWTH1	W8-11	25	24	1		
			505	13	MWTH1	W8-11	25	25			
			506	14	TTH9F3	F8-11	25	22	3		
			507	15	TTH9F3	F8-11	25	21	4		
			508	16	TTH9F3	M2-5	25	21	4		
		102	103	01	MWF12	M8-11	25	23	2		
			105	02	MWF12	T2-5	25	25			90.7
			107	03	MWF11	TH2-5	25	23	2		
			109	04	MWF11	TH2-5	25	23	2		
			110	05	MWF10	T8-11	25	23	2		
			115	06	MWF12	M8-11	25	22	3		
			117	07	M4TTH11	F8-11	25	23	2		
			132	08	MWF12	T2-5	25	23	2		
			134	09	MWF11	TH8-11	25	24	1		
			136	10	MWF11	TH2-5	25	20	5		
			139	11	MWF12	M8-11	25	23	2		
			140	12	M3TF1	W2-5	25	23	2		
			141	13	M4TTH11	F2-5	25	21	4		
			142	14	M3TF1	W2-5	25	22	3		
			159	15	M4TTH11	F2-5	25	25			
			160	16	M4TTH11	F2-5	25	21	4		
			161	17	M4TTH11	F2-5	25	22	3		
			162	18	MWF10	M2-5	25	22	3		
			163	19	MWF10	M2-5	25	22	3		
			164	20	M3TF1	W8-11	25	24	1		
			165	21	M4TTH11	F8-11	25	23	2		
			166	22	M3TF1	W8-11	25	23	2		
			167	23	M3TF1	W8-11	25	23	2		
			168	24	M3TF1	W2-5	25	23	2		
			169	25	MWF11	TH8-11	25	23	2		
			170	26	M3TF1	W2-5	25	21	4		
			171	27	MWF11	TH8-11	25	25			
			172	28	MWF11	TH8-11	25	23	2		
			173	29	MWF11	TH8-11	25	22	3		
			174	30	MWF10	T8-11	25	23	2		
			175	31	MWF11	TH2-5	25	20	5		
			176	32	MWF12	T2-5	25	23	2		
			177	33	M4TTH11	F8-11	25	23	2		
			178	34	MWF10	T8-11	25	23	2		
			180	35	MWF11	TH2-5	25	21	4		
			184	36	MWF10	M2-5	25	24	1		

FIG XII

DIVISION ENROLLMENT REPORT

FEE ASSESSMENT

FEE DATA COLLECTION

Prior to the actual assessment of fees by the computer, data relating to fees must be obtained from various sources, edited to insure its accuracy, and combined to form a single data file which may be utilized by the fee assessment routines. The following is a discussion of the various kinds of data to be included in each fee calculation, the source of the data, its method of collection, and the precautions taken to maximize its reliability.

BASIC FEE STRUCTURE

The first source of data to be considered is the University Catalog from which the basic fee structure may be obtained. Such items as resident and nonresident tuition rates, student activities charges, room and board fees, and various use fees are fixed either by state law or university policy and are not likely to change frequently. For this reason they are compiled as a part of the fee assessment programs. However, they should be reviewed each semester to keep them current with university policy and thus should be easily accessible to the programmer. To satisfy this requirement, all fee rates are grouped together in one section of the program and labeled appropriately so that they can be readily located.

STUDENT NAMES AND ADDRESSES

To facilitate the distribution of printed class schedules and fee statements, students' names and addresses are a necessity. A program is available which builds a fee address record for each student that has been accepted for admission by the university. The initial source of information for this record is an already existing student registration data file. Students' names and addresses and certain fee data such as state of residency and eligibility for exemptions under the Hazelwood Act are extracted from this file.

SCHOLARSHIPS, CONTRACTS, CREDITS, AND EXEMPTIONS

After the fee address file has been constructed other fee data can be added to the file. A student may be eligible for an academic or athletic scholarship. A governmental agency or industrial firm may contract with the university to pay a portion or all of the student's fees, or the student may be eligible for a special exemption from certain fees. If for any reason a student's fees are to be credited, this information must be gathered from an authoritative source prior to the time the student completes the registration process. A special optical mark form, illustrated in Figure XIII, was made available to the Athletic Department, Scholarship Office, Fiscal Office, and Registrar's Office for gathering this data. After the data has been coded, a computer program reads the optical mark forms, checks the validity of the coding, and converts the data to punched cards. This data is then used to update the fee address file. Simultaneously with each update run a current listing is prepared for each of the four offices involved indicating the current status of each student's fee address record. This listing should be checked by the departments to insure that all updates have been processed. An example of the fee address data listing is show in Figure XIV.

ACADEMIC FEES

Some fees are directly related to a student's coursework and therefore cannot be determined until he has completed his course selections. These fees are either associated with an individual course or based upon the total number of credit hours for which the student registers. Included in this group are such fees as tuition, laboratory fees, building use fees, and student services charges. The data necessary for calculating these fees is contained in the class cards and is passed on to the fee assessment routines by the class scheduler.

FEE EXCEPTIONS, SCHOLARSHIPS AND CONTRACTS

STUDENT NUMBER

					6				
					7				
—					0				
0	1	2	3	4	8	5	6	7	8	9
					5	—			
					8				—

FEE ADJUSTMENT CODE

—					0				
0	+	2	3	4	1	5	6	7	8	9
	—				1				

ACTION TO BE TAKEN

(mark one)

ADD TO FILE [—]

REMOVE FROM FILE [ ]

ACCOUNT NUMBER

0	1	2	3	4		5	6	7	8	9

AMOUNT

0	1	2	3	4		5	6	7	8	9

PRINTED IN U. S. A.

IBM 554

McCormick, Thomas J., Jr.

STUDENT NAME

INSTRUCTIONS

use no. 2 pencil
make heavy marks
stay within dashed lines

student number, fee adjustment code, and action to be taken must always be coded and marked.

be sure to write student name on line provided.

FEE ADJUSTMENT CODES

FEE EXCEPTIONS
- 011 hazelwood
- 012 good neighbor
- 013 h. s. scholarship
- 014 connally carrillo
- 015 state orphan
- 016 non-resident
- 017 exempt non-res tuition
- 018 full time staff

ATHLETIC SCHOLARSHIPS
- 041 includes board
- 042 excludes board

OTHER SCHOLARSHIPS – 030
mark all fields

CONTRACTS
enter contract code in field marked fee adjustment code.

FIG XIII

FEE ADJUSTMENT FORM

FEE-EXCEPTIONS

NAME	PERM-NO	HAZEL	G-NEIGH	H-S	CON-CAR	ST-ORPH	NON-RES	EXMP-NR	FULL-TIME
ALEXANDER, RICHARD A	680729						N		
ALFORD, KENNETH NEAL	687232						N		
ALLDREDGE, EDDIE M	672730						N		
ALLEN, DANIEL J	666608						N		
ALLEN, DEANNA C	683823						N		
ALLEN, DONALD R	680431						N		
ALLEN, EDWIN E	490251	H							
ALLEN, HERBERT E	662755						N		
ALLEN, MICHAEL DANA	666285						N		
ALLEN, NEIL H	687111			V					

CONTRACTS

NAME	PERM-NO	CONTRACT-NO.
CALEY, JAMES ARLAN	680250	130
CAMPBELL, GARY D	621527	130
CAMPBELL, GORDON	666537	302
CANNON III, CLAUDE E	653152	103
CANTRELL, DONALD E	685177	103
CARL, DOUGLAS M	682843	124
CARLTON, JAMES B	670980	120
CARNEY JR, ROBERT S	670981	130
CARPENTER, STEWART B	583223	203
CARREKER, LARRY E	676467	302

SCHOLARSHIPS

NAME	PERM-NO	SCHOLARSHIP	AMOUNT
BIRKELBACH, KAREN R	687949	57745	$ 50.00
BIRKELBACH, KAREN R	687949	57388	$150.00
BISHOP, LUCY P	677520	57324	$150.00
BISHOP, ROBERT EUGENE	654008	57005	$375.00
BISHOP, ROBERT EUGENE	654008	57302	$125.00
BIZZAK, JAMES E	676734	57710	$125.00
BLACKHURST, STEPHEN H	666941	57984	$250.00
BLACKWELDER, ROGER L	666276	57776	$150.00
BLAIR, DUDLEY W	666454	57070	$125.00
BLAKENEY JR, THOMAS E	687338	57738	$250.00

SCHOLARSHIPS

NAME	PERM-NO	SCHOLARSHIP	AMOUNT
WOOD, JOEL DON	667237	57388	$275.00
WORLEY, DANNY DALE	654386	57451	$150.00
WRIGHT, DAVID W	682211	57035	$200.00
WURRS, RALPH ALLEN	676744	57388	$200.00
WYLIE, THOMAS O	682212	57232	$150.00
YANTA, MYLES A	675144	57745	$ 50.00
ZEMAN, JAMES EDWARD	686610	57873	$500.00
ZIEGLER, LYNN R	686492	57388	$100.00
ZWARTJES, MICHAEL A	675164	57232	$125.00

FIG XIV

FEE ADDRESS DATA LISTING

STUDENT OPTIONS

Finally there are certain choices which are left to the student that will have an effect on the total amount of fees which he must pay. He may choose to live off campus or in a dormitory and he may eat off campus or in a university dining hall. If he chooses to eat in the dining hall, he must also select one of several board payment plans. The student may have an automobile on campus which requires a parking permit. If so, he may purchase a parking sticker for one semester, two semesters or a full year.

Any of the fee options which the student has are gathered from him as a part of the normal registration process. One of the steps which each student must complete before his class schedule can be constructed is to report to a housing station at the registration headquarters. At this station the student is given a housing authorization card, an example of which was illustrated in Figure VIII. The student who is to reside in a university dormitory is given a housing authorization card which is prepunched with the dormitory, room number, and telephone number if applicable. In addition the card contains a code which is used by the fee assessment programs for calculating room rent. The student who is to live off campus is given a housing authorization card which contains a code indicating that he is a day student and no room rent should be charged. Each student then indicates on his housing authorization card the services which he wished to purchase. The student must now report to a fee assessor who uses a data recorder to punch the options which the student marked into the housing authorization card. At the same time the data recorder punches the student's identification number into the card from the student's indentification badge. The housing authorization card is then returned to the student's registration packet. The registration packets are used as input to the class scheduling program which in turn passes the housing authorization cards on to the fee assessment routines.

INITIAL FEE ASSESSMENT

Each student's fees are calculated initially utilizing the collection of fee data that is available at the time the student is scheduled for classes by the computer. One of the tasks which the fee assessment program must perform is the consolidation of all the fee data for each student. The student's fees may then be calculated and his class schedule and fee statement printed. Figure XV is a sample class schedule and fee statement. A printed voucher is produced for any fees that will be paid by a contract or scholarship. Examples of these vouchers are given in Figure XVI. Other output produced by the program is a permanent fee record and a fee summary card which may be used to access the fee record. The permanent fee record contains all the information required to re-create the schedules and statements. Its principle uses are for the revision of fees and the production of fee accounting records. The fee summary card is used to record the payment of fees or to revise a student's fee statement as will be discussed in more detail in the following section.

FEE UPDATE PROCEDURES

A student may select his courses and fee options as much as two months in advance of the start of the semester for which he is registering. Consequentially his status relative to certain fees may have changed. For instance he may have requested to live in a university dormitory, but has since married and now desires to live off campus. This necessitates a revision of his fee statement. Due to the early decisions which a student must make in exercising his fee options, it is expected that there will be fee revisions. To minimize the effort required in making these revisions and also to maintain a fee record for each student, a set of fee updating procedures was established.

667319 BIRKELBACH DONALD F M 3CHEM 10105
DORM 14 307 TEL. 845-6500

THIS IS AN INVOICE, NOT A RECEIPT FOR FEES PAID.

You will not be considered enrolled nor will a class schedule be released or room assignment confirmed until the fees set out below are fully paid. All refunds and/or adjustments will be made after your arrival on campus in accordance with published policy. You must return this invoice along with fee payment in the enclosed reply envelope. Your early remittance will be appreciated.

(See reverse side for additional information)

TEXAS A & M UNIVERSITY

BIRKELBACH DONALD F
P O BO
COLLEG

SPRING

667319 BI
DO

5 DAY INST
PHONE AND

667319 BIRKELBACH DONALD F M 3CHEM 10105
DORM 14 307 TEL. 845-6500

SUBJ.	CRS.	SECT.	CR.		BLDG.	ROOM
CHEM	317	500	2	TTH8	CHEM	220
CHEM	324	357	3	MWF9	CHEM	228
CHEM	328	340	3	M2 WF2-5	CHEM	208
CHEM	38C	500	1	M1	CHEM	220
GERM	103	127	3	MWF11	ACAD	123
POLS	206	230	3	M3TTH10	MSCI	111
			15			

TEXAS A & M UNIVERSITY

STUDENT COPY

NOTE: THIS SCHEDULE IS YOUR ADMISSION TO CLASS. CARRY IT WITH YOU AT ALL TIMES

BIRKELBACH DONALD F
P O BOX 1738
COLLEGE STATION, TEXAS 77840

TEXAS A & M UI

SPRING SEM

667319 BIRKE
DORM

SPRING

5 DAY INSTALL
PHONE AND AIR

667319 BIRKELBACH DONALD F M 3CHEM 10105
DORM 14 307 TEL. 845-6500

SUBJ.	CRS.	SECT.	CR.		BLDG.	ROOM
CHEM	317	500	2	TTH8	CHEM	220
CHEM	324	357	3	MWF9	CHEM	228
CHEM	328	340	3	M2 WF2-5	CHEM	208
CHEM	38C	5C0	1	M1	CHEM	220
GERM	103	127	3	MWF11	ACAD	123
POLS	206	230	3	M3TTH10	MSCI	111
			15			

TEXAS A & M UNIVE

STUDENT COPY

FEE RECEIPT

RETAIN FOR YOUR R

SPRING SEM

TEXAS A & M UNIVERSITY

REGISTRAR COPY

BIRKELBACH DONALD F
P O BOX 1738
COLLEGE STATION, TEXAS 77840

SPRING SEMESTER 1969 RUN OF JAN. 02 1969

667319 BIRKELBACH DONALD F M 3CHEM 10105
DORM 14 307 TEL. 845-6500

5 DAY INSTALLMENT
PHONE AND AIR

FEE DESCRIPTION	AMOUNT
TUITION	50.00
STUDENT SERVICE	30.00
BUILDING USE FEE	20.00
PROPERTY DEPOSIT	
ROOM, BOARD & LAUNDRY	237.50
IDENTIFICATION CARD	
SERVICE CHARGE	1.00
LABORATORY FEES	6.00
PHYSICAL EDUC. SERVICE	
ROTC UNIFORM HANDLING	
PARKING PERMIT	
STUDENT ACTIVITIES	
SUB-TOTAL	344.50
LESS SCHOLARSHIP 57388	100.00
TOTAL	244.50

TEXAS A & M UNIVERSITY

FISCAL COPY

FEE RECEIPT

PAY THIS AMOUNT → 244.50

SPRING SEMESTER 1969 RUN OF JAN. 02 1969

FIG XV

SCHEDULE

SCHED. NO. C0535
PERM. NO. 666454

SCHOLARSHIP VOUCHER

AUDIT NO.

PAY TO BLAIR DUDLEY W

FUND NO. 0188 OBJ. CLASS 480 DEPT. NO. 57070 AMOUNT 104.00

SCHED. NO. C0535
PERM. NO. 666454

SCHOLARSHIP VOUCHER

AUDIT NO.

PAY TO BLAIR DUDLEY W
NOT APPLIED TO FEES

FUND NO. 0188 OBJ. CLASS 480 DEPT. NO. 57070 AMOUNT 21.00

SCHED. NO. C0166
PERM. NO. 686718

AGUILAR DAVID

CONTRACT 302 ACCOUNT 0120

TYPE FEE	
TUITION	50.00
STUDENT SERVICE	30.00
BUILDING USE FEE	20.00
LABORATORY FEES	4.00
PHYSICAL EDUC SERVICE	8.00
TOTAL	112.00

FIG XVI

VOUCHERS

FEE REVISION

The permanent fee record, which is created for each student at the time his class schedule is generated by the computer, contains two sets of fee data. The first set of data is the data used to calculate the student's initial fees. This data is updated each time the student's fees are altered prior to the time his fees are paid. When the student's fees are paid, the second set of fee data is made equal to the first. Any fee revision after the student pays his initial fees causes the second set of fee data to be updated.

At the time the student's original fee statement was prepared, a fee summary card was also produced. This card contains the student's schedule number which can be used to access his fee record on the permanent fee file. The fee summary card also contains the total amount of the fee statement. If the student's fees required revision, this card is punched with the revised fee data using data recording equipment. The source of the data being punched is a deck of pre-punched master cards, one for every possible fee alteration. As many changes as required may be punched into the fee summary card. The punched fee summary card is then used as input to the fee update program which locates the fee record to be modified and updates the record. At the same time an audit listing (Figure XVII) of all transactions is prepared. If the fee revision is made prior to the payment of the initial fees, a revised fee statement is prepared along with a revised fee summary card reflecting the new total fees. All revisions after the payment of initial fees cause the permanent fee record to be updated, but do not result in a new fee statement being prepared.

Other fee revisions are made necessary by the students adding and/or dropping courses after the original schedule and fee statement has been produced and the fees paid. During the drop/add procedure any changes in fee

HISTORY OF FEE PAYMENTS AND ADJUSTMENTS
RUN DATE FEB. 17 1969

PERM NO.	STUDENT NAME	SCHED NO.	FEE ADJUSTMENTS	CARD CODE	FEE AMOUNT	COMMENTS
650026	PITTMAN FRANK M	11722		F	80.00	PAYMENT OF INITIAL FEE STATEMENT MADE
660616	PLUMMER, BETTY CONTREL	11723		F	15.00	PAYMENT OF INITIAL FEE STATEMENT MADE
630798	RAMCHANDRAN, S T	11724		F	80.00	PAYMENT OF INITIAL FEE STATEMENT MADE
623464	ROSENBAUM GENE WALDO	11726		F	26.00	PAYMENT OF INITIAL FEE STATEMENT MADE
590717	ROSENOW, DARRELL THAIN	11727		F	27.00	PAYMENT OF INITIAL FEE STATEMENT MADE
640467	ROSIN WILLIAM J	11728		F	80.00	PAYMENT OF INITIAL FEE STATEMENT MADE
600192	SCHLICHT FRANK GLOVIS	11729		F	26.00	PAYMENT OF INITIAL FEE STATEMENT MADE
660353	SEAL MICHAEL R	11730		F	80.00	PAYMENT OF INITIAL FEE STATEMENT MADE
630152	SHARBER, JAMES RANDALL	11731		F	80.00	PAYMENT OF INITIAL FEE STATEMENT MADE
660158	SHIH WEITUN	11732		F	80.00	PAYMENT OF INITIAL FEE STATEMENT MADE
573348	SHORT JAMES H JR	11733		F	26.00	PAYMENT OF INITIAL FEE STATEMENT MADE
640072	STANFIELD FOSTER A	11738		F	80.00	PAYMENT OF INITIAL FEE STATEMENT MADE
630003	TATE JOHN B	11740		F	80.00	PAYMENT OF INITIAL FEE STATEMENT MADE
671216	THOMPSON PAUL F	11741		F	26.00	PAYMENT OF INITIAL FEE STATEMENT MADE
659431	VINAS-ROMAN JAIME A	11744		F	72.00	PAYMENT OF INITIAL FEE STATEMENT MADE
680938	WALLIN CHARLES S	11745		F	15.00	PAYMENT OF INITIAL FEE STATEMENT MADE
621551	WILLIAMS, RONALD JOHN	11746		F	26.00	PAYMENT OF INITIAL FEE STATEMENT MADE
600159	WILSON, KENNETH OWEN	11747		F	26.00	PAYMENT OF INITIAL FEE STATEMENT MADE
593510	WINNINGHAM, JOHN DAVID	11748		F	58.00	PAYMENT OF INITIAL FEE STATEMENT MADE
651085	WOODRUFF WILLIAM L	11750	Y	F	37.00	ADJUSTMENT MADE TO INITIAL FEES
620343	ALLBAUGH CLYDE ALLEN	11751		F	26.00	PAYMENT OF INITIAL FEE STATEMENT MADE
651163	BURKE EDWARD PASCHAL	11752		F	26.00	PAYMENT OF INITIAL FEE STATEMENT MADE
672292	CARRELL EVELYN K	11753		F	15.00	PAYMENT OF INITIAL FEE STATEMENT MADE
640994	KERR WALTER L	11754		F	18.00	PAYMENT OF INITIAL FEE STATEMENT MADE
650933	MOSLEY LILLIAN F	11755		F	18.00	PAYMENT OF INITIAL FEE STATEMENT MADE
651768	MOSLEY RAMON T	11756		F	48.00	PAYMENT OF INITIAL FEE STATEMENT MADE

FIG XVII

AUDIT LISTING

data resulting from the dropping or adding of courses are reflected in the second set of fee data contained in the student's permanent fee record. After the drop/add period is over these changes are processed along with any other fee changes that have occurred since the original payment of fees to produce a single supplemental fee statement. The supplemental fees are calculated by taking the difference between the fees based on current fee data and the fees that were previously paid. Again a fee summary card is produced for recording payment or making further fee adjustments.

PROCESSING FEE PAYMENTS

As fee payments are received at the University's Fiscal Office, the student's fee summary card is removed from an unpaid fee file. The total fees which are punched and printed on the card are visually compared with the amount of payment submitted by the student plus any credit which may be due him. If the amounts are in agreement, the fee summary cards are batched until the end of the day. The paid fee statements and fee summary cards are then totaled and balanced with each other and with the day's receipts. The balanced fee summary cards are further audited with a computer tabulating program. If all totals are in agreement through this point, the cards are processed by the fee update program to record the payment on the student's permanent fee record. Both fee payments and fee adjustments are entered into the system by use of the fee summary card. The fee update program recognizes a payment card by the fact that there are no fee data adjustments punched into it. As the payments are processed, the student's permanent fee record is flagged to indicate that payment was made.

FEE DISTRIBUTION

One of the main disadvantages of a manual fee assessment system is that the fee statements must then be keypunched before they can be processed by computer. It may be weeks or even months before all the fees have been

keypunched, verified, and are ready to enter the university's accounting system. By using an automated fee assessment and updating system, all fees may be distributed to their various fiscal accounts at the end of the fiscal period in which they were paid. In addition the need for a fee audit is virtually eliminated since all fee assessments are made by the computer. A program is available which produces accounting records for all paid fees utilizing the permanent fee file.

BOARD INSTALLMENT PAYMENTS

At Texas A&M University students who eat in the university's dining hall may choose to pay their board fees for the entire semester or in three installments. Before the automated fee system was implemented at A&M, hand written receipts were prepared for each installment payment. In addition to the task of writing more than 4,000 fee receipts, the keypunching task was also very sizable. The automated fee system provides a means of producing these receipts automatically and at the same time punching the receipt cards. The permanent fee data file created by the fee assessment program and maintained by the fee updating system contains all the information needed for the calculation and preparation of the receipts. Then as the student pays his board installment a receipt is already prepared for him and a fee card is available for direct entry into the accounting procedures.

ADDITIONAL PROCEDURES

SCHEDULE DISTRIBUTION

The student's fee assessment and computer schedule of classes are printed by computer at various intervals during the pre-registration period. The fee assessments and schedules are then delivered to the Fiscal (Bursar's) Office formailing to the student.

The student's schedule and fee assessment are printed on a 3-part form (Figure XV), the last copy of which has had the schedule blocked out.

The Fiscal Office mails to the student the last copy which contains the fee assessment indicating all (both academic and other) fees assessed during the pre-registration period. Accompanying this assessment is a statement clearly pointing out that when the assessed amount is paid, the student will be properly registered and a schedule of classes and a paid fee receipt (the second copy) will be mailed to him. Upon receiving his schedule of classes, the student is now prepared to attend the first meetings of classes and if necessary, is eligible to participate in the add and/or drop program. It is felt that through this method of student schedule distribution there is an incentive for the student to pay early in order that his schedule of classes may be reviewed by him several days prior to the beginning of classes.

Second, the Fiscal Office upon receiving the student's fees forwards to the Registrar the original copy of the student's schedule of classes. The Registrar now has valid and official notification that the student has paid assessed fees and is considered properly registered for the incoming semester.

DELAYED REGISTRATION

Students who do not register during pre-registration are able to accomplish this during the delayed registration. The delayed registration period is conducted for five days prior to the opening of the semester. The procedure for academic counseling with the student is the same during this period as in pre-registration. After visiting with the academic counselor, the student then submits his course requests at a central office. At this central point, data for housing, fees, and course requests are collected in the same manner as in pre-registration. The major difference between pre-registration and delayed registration lies in the distribution of the student's schedule of classes.

Each student is informed at the time he turns in his course request packet that he must return to this central point the next day to get a fee assessment. Upon paying the assessed fees, a schedule of classes and paid fee receipt are given to the student. The Fiscal Office then forwards to the Registrar's Office the student's original schedule of classes. No mailing occurs during the delayed registration.

The student's course request is sent to the Computer Center each night during delayed registration and processed in the same manner as during pre-registration. The final registration period is conducted the first five days of classes and is referred to as late registration. The procedure for registering during late registration is the same as for delayed registration. Students who participate in late registration are penalized with a $4.00 late fee.

SCHEDULE REVISIONS

In some cases after the student receives a schedule of classes various revisions need to be made in his registration. These revisions (adds

and/or drops) are necessary because of failing needed prerequisites, changes of major, overloading of courses, and student work schedules. Schedule revisions are honored five days prior to the beginning of classes. At the end of the fifth class day adds are terminated but drops are accepted until the twelfth class day.

The student who needs schedule revisions returns to the academic advisor to make his requests. Upon approval of the advisor the student then presents his schedule revision request on a data card (Figure XVIII) and his current schedule of classes at a central office. At this central point, a check is made to see if the student has a drop/add authorization data card (Figure XIX) in the files. Drop/add authorization cards are found in the files only if the student has previously paid the assessed registration fees. If the drop/add authorization card is present, the student then submits his revision request. At this same time the words SCHEDULE IN REVISION are stamped on the student's copy of his current schedule of classes. The student is then told to return the next day to obtain his revised schedule of classes (Figure XX).

The drop/add authorization data card is a card that is produced at the same time that a student's schedule (original or revised) is printed by the computer. It includes the student's name and schedule sequence number and is the key to permit any schedule revision request into the computer. At the time the student pays his fees to the Fiscal Office, this drop/add authorization card is sent to the Registrar's Office along with the student's schedule of classes. When the student comes to the central office for a schedule revision, this drop/add authorization is sent to the computer to permit a schedule revision to take place.

Each night card packets consisting of a drop/add authorization card,

STUDENT NUMBER	LAST NAME	FIRST	MIDDLE	MAJOR	CLASS

TEXAS A & M UNIVERSITY — **SCHEDULE REVISION REQUEST**

INSTRUCTIONS

1. A change of schedule must be initiated and approved by the student's academic advisor or college dean.
2. Normally, a course may not be dropped without grade after the 12th class day of a semester. (4th class day of SS term).
3. Normally, a course may not be added after the first week of a semester. (third class day of SS term).
4. The grades of WP and WF apply only after a student has resigned from the University.
5. Any registration changes made after the established deadlines must have the approval of the dean concerned.

	DEPT.	COURSE NUMBER	CREDIT HOURS	DIV.	REMARKS
DROP					

	DEPT.	COURSE NUMBER	CREDIT HOURS	DIV.	REMARKS
ADD					

REASON FOR CHANGE: _____

THIS COPY FOR ADVISOR OR DEAN

APPROVAL DATE: _____

SIGNATURE OF ADVISOR OR COLLEGE DEAN

DROP-ADD REQUEST

FIG XVIII

655050 DROEMER EVERARD CAR 08918

DROP/ADD AUTHORIZATION

DROP-ADD AUTHORIZATION

FIG XIX

667319 BIRKELBACH DONALD F M 3CHEM 00007
REVISED SCHEDULE

SUBJ.	CRS.	SECT.	CR.		BLDG.	ROOM
CHEM	317	500	2	TTH8	CHEM	220
CHEM	324	357	3	MWF9	CHEM	228
CHEM	328	340	3	M2 WF2-5	CHEM	208
CHEM	380	500	1	M1	CHEM	220
GERM	103	127	3	MWF11	ACAD	123
			12			

BIRKELBACH DONALD F

TEXAS A & M UNIVERSITY

REGISTRAR COPY

SPRING SEMESTER 1969 RUN OF JAN. 21 1969

667319 BIRKELBACH DONALD F M 3CHEM 00007
REVISED SCHEDULE

NOTE..
ANY FEE-REVISION WILL BE BILLED AFTER THE END OF THE DROP-ADD PERIOD.

FEE DESCRIPTION	AMOUNT
TUITION	
STUDENT SERVICE	
BUILDING USE FEE	
PROPERTY DEPOSIT	
ROOM, BOARD & LAUNDRY	
IDENTIFICATION CARD	
SERVICE CHARGE	
LABORATORY FEES	
PHYSICAL EDUC. SERVICE	
ROTC UNIFORM HANDLING	
PARKING PERMIT	
STUDENT ACTIVITIES	
TOTAL	

TEXAS A & M UNIVERSITY

FISCAL COPY

FEE RECEIPT

SPRING SEMESTER 1969

PAY THIS AMOUNT → RUN OF JAN. 21 1969

REVISED SCHEDULE

FIG XX

data cards for courses to be added and/or dropped, and the drop/add request card are sent to the Computer Center for processing.

The next day the student obtains the revised schedule at which time he must surrender his old schedule of classes. The Registrar's Office receives a copy of the revised schedule which replaces the old schedule in his files. The student and the Registrar's Office have a current record showing all revisions that have occurred. Also each night a new drop/add authorization card is prepared and returned to the Registrar's Office for future revisions which might be requested.

COMPUTER ASSIGNMENT

The process used to revise a schedule is essentially the same as that of the initial scheduling process (Section IV, Schedule Construction). The major difference is that efforts are made to leave the student in the sections he intends to keep while adding new ones.

The schedule number read in on the drop/add authorization is used to find the student's old schedule. Any drops are performed and a new scheduling attempt is made using the courses the student kept plus added courses. If the adds will not fit in the existing schedule, the student is completely rescheduled. In the event that a conflict exists, none of the adds are honored and the student's old schedule, less the drops which he requested, is returned to him.

No fee changes are made at this time. If the schedule revision necessitates a fee change, the student will receive a supplemental fee statement at the conclusion of the drop/add period.

SYSTEM EVALUATION

This section is provided to present information relative to actual experience with the registration system that has been described. The system was utilized to register the student body at Texas A&M University for the Spring Semester 1969.

CALENDAR OF EVENTS

PRE-REGISTRATION

The pre-registration phase was initiated on November 4, 1968 and was closed on December 6, 1968. During this period the students reported to their major departments for counseling and to obtain a course request. The individual departments were allowed to handle this work in the manner they preferred. Some scheduled students by rank (seniors first, juniors second, etc.) or alphabetically. Some used a first come, first served policy.

SIMULATED SCHEDULING

One of the advantages of the pre-registration system is to simulate the registration based on a sample of the student course requests. This is done by feeding the student course requests to the computer and preparing a schedule. Since no schedules are printed and mailed, it is possible to change various aspects of the system. This provides the opportunity to increase sections, delete courses, or to take other measures that might be desired.

A total of 5377 student requests were used for the simulation run. This provided some useful information, but it was found to be too small a sample. It would have been more useful if approximately 70% of the student requests were obtained before the simulation run was made.

SCHEDULE CONSTRUCTION

The first schedules were printed on November 24, 1968. At this time a total of 5003 schedules were prepared for mailing to the students. Scheduling runs were then made about once a week. A total of 10,487 students were

scheduled during the pre-registration period.

FEE COLLECTION

A fee payment deadline of January 6, 1969 was established for the students in the pre-registration phase. Some students paid their fees immediately upon receipt of their bills and others waited until the last moment. By January 15, 1969 a total of 7,300 students had paid their fees and had received their schedules.

One complaint by the students was the fee payment deadline was too early and caused a financial hardship. This complaint was probably justified and the date will be later on future registrations. Time must be allowed, however, to receive payments and to return the schedules to the students by mail prior to initiating the late registration period.

REGISTRATION DATA

The following information indicates the experience of the registration activity.

A total of 12,852 course requests were processed to register 11,839 students. The multiple runs on some requests were due to either errors detected by the edit programs or schedule rejects. The 890 rejects (approximately 7%) were due to one of three reasons:

(1) Lunch hour conflicts 364

(2) Hour conflicts 339

(3) Closed sections 187

The reject rate is expected to drop as more experience is obtained. For the first time some feed-back is available as to schedule problems encountered by small groups of students.

The schedule revision (drop/add) portion of the system revised 5,128 students' schedules. Of these schedules, only 11.11% were completely repro-

grammed. Approximately 5% of the students' schedules were rejected during this process but these students retained their original schedules, less any courses which they dropped.

The performance of the computer system on the whole has lived up to our expectations. Future work, however, will continue to be done on it to make needed improvements.

CONCLUSIONS

The following conclusions were made as a result of the experience with the automated registration system.

(1) The system was very effective in increasing the ability to provide students with the desired courses. The pre-registration provides an excellent planning tool and numerous schedule changes were made to facilitate the overall scheduling process.

(2) A much better student counseling program resulted from the system. Each student had to sit down with his advisor and review his program and progress before securing approval to request specific courses.

(3) The overall student record and reporting system was improved greatly as a result of this system. Student academic classifications, courses of study, instructors' class rosters, add and/or drop updater, and fee accounting records were placed in an accurate and manageable order due to various requirements of the system. The student credit hour report to the Coordinating Board was produced instantaneously after the twelfth class day as a result of the excellent computer records established from the automated registration system.

(4) The manual effort and time required to complete the registration process was greatly reduced for both faculty and staff.

(5) The student acceptance of the system was generally good. They were very pleased with the ease with which their registration could be completed. The major disadvantages from the student's viewpoint was the lack of ability to select individual professors and specific course times. They realized, however, that it is not possible to accommodate specific requests for all students and in general they seemed to feel that the system was fair to all concerned.

RECOMMENDATIONS

The following recommendations are submitted for those colleges and universities which might be considering the implementation of an automated registration system.

(1) Secure top level administrative support for implementing the system. Since many changes will have to be made in existing procedures, it is vital that a strong administrative committment to the system be obtained.

(2) Allow sufficient time for planning and implementing the system. This may require as much as two years. Good planning of every phase is vital.

(3) Be sure that a strong systems capability exists and that the necessary computer facilities are available.

(4) A computerized student record system is a vital aspect of a successful automated registration system. If such a system does not exist, it is recommended that it be developed as a first step in the automated process.

(5) A good system for publication of information relative to the system should be developed. All persons concerned (student, faculty, administration) should be advised of the system and educated to its procedures.

APPENDIX A
MACHINE REQUIREMENTS

The programs comprising the sectionizing system are written in IBM COBOL F, with the exception of a few assembly language subroutines which perform logical operations on binary vectors. Several of the programs take advantage of the SORT verb implemented for the 360 COBOL and a direct access file is used.

The system at present requires 240 thousand bytes of memory and enough devices to service 5 sequential data sets and one direct access data set. However, some of these resource requirements are due to the ways in which features particular to A&M, such as the print and fee calculation routines, were designed. A minimal hardware requirement would probably be on the order of 200K bytes and 5 sequential data sets.